

UNCERTAINTY IN LIFE CYCLE ASSESSMENT:

Sources, Types, Propagation, Evaluation, Mitigation and Reporting

Introduction

LCA is the world's most authoritative environmental assessment method built from cradle to grave

Problem

Uncertainty is the killer of LCA credibility and comparability, and lack of holistic understanding

Goal

To propose a holistic framework for visualizing the sources, types, propagation, evaluation, mitigation, and reporting of uncertainty

Solution

Review and integration of ISO 14040, ISO 14044 standards and ILCD manuals with latest publications until 2025

1. Goal & Scope Definition

Functional Unit

System Boundary

Cut-off Criteria

3. Impact Assessment

Characterisation Model

Characterisation Factor

Assessment Result

2. Inventory Analysis

Collection Data

Calculation Data

Allocation

Data Quality Evaluation

4. Interpretation

Significant Analysis

Uncertainty Analysis
& Sensitivity Analysis

5. Reporting

Transparency

Limitations

Opportunity

Context Uncertainty
 Model Uncertainty
 Quantity Uncertainty
 Mitigation Path

Relevance

This framework clearly visualises the location, nature, flow, evaluation, treatment and communication of uncertainty in LCA, and is beneficial for researchers to develop a holistic understanding from a systems science perspective